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REMARKS

Applicants appreciate the Examiner's thorough consideration provided the present application. Claims 1-20 are currently pending in the instant application. Claims 1-14 have been amended. Claims 1 and 15 are independent. Claims 15-20 have been added for the Examiner's consideration. The additional claims are fully supported by the original written description, including but not limited to, pages 9-13 of the specification and FIGs. 6-11B. Reconsideration of the present application is earnestly solicited.

Drawings

The drawings have been objected to by the Examiner. Specifically, the Examiner has requested that FIGs. 1 to 5 should be designated by a legend such as --PRIOR ART--. This objection is respectfully traversed. Applicants have filed a Drawing Change Approval Request (DCAR) concurrently herewith that addresses the Examiner's requested changes. [Without conceding the propriety of the Examiner's objection,] but merely to timely advance the prosecution of the present application, FIGs. 1-5 have been amended to include the legend "Background Art." Accordingly, these objections have been obviated and/or rendered moot. In addition, Applicants will submit formal drawings upon approval of the concurrently submitted DCAR.

Information Disclosure Statement

The Examiner has requested copies of the references listed in the IDS filed on July 25, 2002. The Examiner is reminded that the present application is in the national phase of a PCT application. Accordingly, some or all of the documents listed in the IDS should be forwarded to the Examiner from the International Search Authority. However, in order to expedite the prosecution of the present application, Applicants will forward the requested documents under separate cover.

Claim Rejections Under 35 U.S.C. § 112

Claims 1-14 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

In light of the foregoing amendments to the claims, Applicants respectfully submit that these rejections have been obviated and/or rendered moot. However, Applicants respectfully submit that the foregoing amendments have been made to merely clarify the claimed invention.

Without conceding the propriety of the Examiner's rejections, but merely to timely advance the prosecution of the application, Applicants have incorporated the changes recommended by the Examiner. Applicants submit that the requested changes do not appear to either raise a substantial question

of the patentability of the claimed invention nor do they narrow the scope of the claimed invention.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sidney (U.S. Patent No. 1,951,215) in view of Gruett et al. (U.S. Patent No. 5,984,652). This rejection is respectfully traversed.

In light of the foregoing amendments to the claims, Applicants respectfully submit that these rejections have been obviated and/or rendered moot. Applicants submit that it would not have been obvious to have modified the fuel pump (the Examiner refers to this device as a "reciprocating compressor" in the Office Action, page 5, paragraph 1) of Sidney with the teachings of the pump of Gruett et al. In addition, even if the alleged combination were obvious, Applicants submit that the prior art of record fails to teach or suggest each and every element of the unique combination of elements of the claimed invention.

For example, with respect to claim 1, the prior art of record does not appear to teach or suggest the combination of elements including the limitation(s) of "a hemispherically shaped discharge valve disposed so as to be in contact with the front end surface of the cylinder when said piston is in said first position and separated from said front end surface of said cylinder when said piston is in said second position." The Sidney patent clearly relies upon a ball-check device for the fuel pump shown in the accompanying figures. The

Gruett compressor only utilizes a poppet valve 99 component that is relatively flat in profile with a single protruding edge. Accordingly, this rejection should be withdrawn.

With respect to claims 3 and 4, the prior art of record does not appear to teach or suggest the features of having "stepped surfaces" on the discharge cover. The Examiner has noted that Sidney fails to teach or suggest these features. In addition, the Examiner has indicated that the Gruett patent teaches the alleged shortcomings. However, the Examiner will note that only a single recessed portion is shown on the poppet valve 99 of the Gruett device (see Fig. 5 of Gruett), e.g., the allegedly analogous portion to the discharge cover of the claimed invention. In addition, the spring is tapered in a direction opposite to that of the Sidney patent. Further, Gruett includes another recessed portion on a surface of the cylinder that is not located on the allegedly analogous discharge cover of either device. Accordingly, these rejections should be withdrawn.

With respect to claims 8-10, the Examiner has rejected the subject matter of claims 8-10 with the alleged combination of the prior art of record. However, if the Examiner maintains these rejections in response to this Amendment, Applicants respectfully request clarification as to where in either of the Sidney and/or Gruett patents the features of these claims are taught or suggested.

With respect to claim 15, the prior art of record fails to teach or suggest the combination of elements of the claimed invention, including the

limitation(s) of: "a hemispherically shaped discharge valve disposed so as to be in a position adjacent to said opened end of said discharge cover, said discharge valve including a rear surface and a front surface; and a conically-shaped valve spring having a pair of ends respectively engaged with the rear surface of the discharge valve and with the inner surface of the discharge cover." Accordingly, as discussed hereinabove with reference to the Gruett and Sidney patents, this rejection should be withdrawn and the present application should be passed to Issue.

In accordance with the above discussion of the patents relied upon by the Examiner, Applicants respectfully submit that these documents, either in combination together or standing alone, fail to teach or suggest the invention as is set forth by the claims of the instant application.

As to the dependent claims, Applicants respectfully submit that these claims are allowable due to their dependence upon an allowable independent claim, as well as for additional limitations provided by these claims.

CONCLUSION

Since the remaining patents cited by the Examiner have not been utilized to reject the claims, but rather to merely show the state-of-the-art, no further comments are necessary with respect thereto.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

In the event there are any matters remaining in this application, the Examiner is invited to contact Matthew T. Shanley, Registration No. 47,074 at (703) 205-8000 in the Washington, D.C. area.

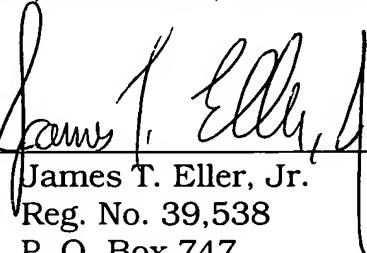
Applicants respectfully petition under the provisions of 37 C.F.R. § 1.136(a) and § 1.17 for a one-month extension of time in which to respond to the Examiner's Office Action. The Extension of Time Fee in the amount of **\$110.00** is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Version with Markings to Show Changes Made

MARKED-UP VERSION OF AMENDMENTS

IN THE CLAIMS

Claims 15-20 have been added.

The claims have been amended as follows:

1. (Amended) A discharge valve apparatus for a reciprocating compressor comprising:

a cylinder having a front end surface and a rear end surface;

a discharge cover having a built-in volume so as to cover the front end surface of [a] the cylinder;

a piston within said cylinder, said piston being capable of a reciprocating movement between a first position and a second position;

a hemispherically shaped discharge valve disposed so as to be in contact with [contacted/separated to/from] the front end surface of the cylinder when said piston is in said first position and separated from said front end surface of said cylinder when said piston is in said second position [by a piston which undergoes a reciprocating movement inside the cylinder]; and

a valve spring having both ends respectively [adhered to] engaged with a rear surface of the discharge valve and [by] with an inner surface of the discharge cover, said inner surface of said discharge cover [which is] facing the rear surface of the discharge [cover] valve, said valve spring [so as to] elastically supporting the rear surface of the discharge valve,

wherein the valve spring is formed [as] with a conical shape in which a rotation radius is gradually [reduced or increased] tapered so as to prevent [a

part from] adjacent portions of said valve spring from impacting [to other parts during compression] with each other when said valve spring is in a compressed state.

2. (Amended) The apparatus [of] according to claim 1, wherein the valve spring is wound more than twice.

3. (Amended) The apparatus [of] according to claim 1, [wherein] further comprising at least one stepped [unit is] surface being formed inside the discharge cover, and [therefore] wherein a front end of the valve spring is prevented from contacting [not contacted to] an inner wall of the discharge cover [, whereby abrasion generation is prevented].

4. (Amended) The apparatus [of] according to claim 3, [wherein] further comprising a second stepped [unit] surface in which an end of the valve spring is inserted, said second stepped surface being [is] formed [successively] adjacent to the at least one stepped [unit] surface and preventing said front end of the valve spring from engaging said inner wall.

5. (Amended) The apparatus [of] according to claim 1, said valve spring including a plurality of coils, wherein a [certain] gap is formed between said [wires] coils of the valve spring [when the valve spring is projected on the inner wall of the discharge cover].

6. (Amended) The apparatus [of] according to claim 1, wherein a center of the valve spring and a center of the discharge valve are on a common [same] axial line.

7. (Amended) The apparatus [of] according to claim 1, wherein a gap between an outer diameter of the discharge valve and an inner diameter of the discharge cover is more than 1mm.

8. (Amended) The apparatus [of] according to claim 1, wherein the discharge valve comprises:

a plane pressure face [unit which is adhered to] engaging the front end surface of the cylinder; and

a pressure [back] rear face [unit which is formed protruded] extending from [on] a side facing the plane pressure face [unit], wherein [so that its] a diameter of said pressure rear face [is] gradually [reduced] reduces in a direction from an edge toward [the] a center [direction] of said pressure rear face.

9. (Amended) The apparatus [of] according to claim 8, [wherein] further comprising a parting line [is] being formed on a position where the plane pressure face meets the pressure rear [back] face.

10. (Amended) The apparatus [of] according to claim 8, wherein the discharge valve further comprises an undercutting surface [unit formed as biased] being formed in a position opposite to at least one of the pressure face and the pressure [back] rear face.

11. (Amended) The apparatus [of] according to claim 8, wherein the pressure [back] rear face [unit] further comprises a spring insert [unit so as to be forcedly] capable of being inserted into the valve spring.

12. (Amended) The apparatus [of] according to claim 11, wherein the spring insert [unit] includes a vertical portion and a horizontal portion.

13. (Amended) [The apparatus of claim 1,] A method of making the apparatus of claim 1, said method comprising:

injection molding the discharge valve with a first metal mold and a second metal mold, wherein said first metal mold includes a contour for forming the plane pressure face and the second metal mold includes a contour for forming the pressure rear face and the undercutting surface on the discharge valve; and

forming [wherein] a gate [is formed] on said first [fixed] metal mold on which the plane pressure face unit is molded[,] when the discharge valve is [fabricated by an] injection molded [molding method].

14. (Amended) [The apparatus of claim 1,] The method according to
claim 13, wherein a plurality of eject pins are formed on [a movable] the second
metal mold on which the pressure [back] rear face [unit] is formed [,] when the
discharge valve is [fabricated by an] injection [molding method] molded.